
Two New Species of Andean Tuberos *Begonia* in the *B. octopetala* Group (Begoniaceae)

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ABSTRACT. A morphologically distinct group of 10 species within the *Begonia* L. sect. *Eupetalum* (Lindl.) A. DC. is identified and informally named as the *B. octopetala* L'Hér. species group. Two new species of *Begonia* (Begoniaceae) are described and illustrated from this group. The new species *B. pseudopleiopetala* Tebbitt is based upon type material collected from the Cajamarca region in Peru and is also known from the Piura region of Peru; the second new species *B. marinae* Tebbitt is based upon type material collected from the Santa Cruz Department in Bolivia and is also known from La Paz, Chuquisaca, and Tarija departments, Bolivia, as well as the province of Salta in adjacent Argentina. A taxonomic synopsis of *B. octopetala* and a description of one additional species from this species group, *B. pleiopetala* A. DC., are also provided for comparison. *Begonia gracillima* A. DC. and *B. tenuicaulis* A. DC. are newly synonymized with *B. pleiopetala*. Lectotypes are provided for *B. gracillima* [= *B. pleiopetala*], *B. pusilla* A. DC. [= *B. pleiopetala*], *B. tenuicaulis* [= *B. pleiopetala*], and *B. warburgiana* Hieron. [= *B. pleiopetala*].

RESUMEN. Un grupo morfológicamente distintos de 10 especies dentro de la *Begonia* L. sección *Eupetalum* (Lindl.) A. DC. es identificado y nombrado informalmente el grupo de especies *B. octopetala* L'Hér. Dos nuevas especies de *Begonia* (Begoniaceae) se describen e ilustran de este grupo. La nueva especie *B. pseudopleiopetala* Tebbitt se basa en material de tipo recogido de la región de Cajamarca, en Perú, y también se conoce de la región de Piura de Perú; la segunda especie de nuevos *B. marinae* Tebbitt se basa en material de tipo recogido en el departamento de Santa Cruz, en Bolivia, y también se conoce de La Paz, Chuquisaca y departamentos de Tarija, Bolivia, así como de la provincia de Salta en Argentina adyacente. Una sinopsis taxonómica de *B. octopetala* y una descripción de una de las especies adicionales de este grupo de especies, *B. pleiopetala* A. DC., también se proporcionan para su comparación. *Begonia gracillima* A. DC. y *B. tenuicaulis* A. DC. han sido recientemente sinonimizado con *B. pleiopetala*.

Lectotipos se proporcionan para *B. gracillima* [= *B. pleiopetala*], *B. pusilla* A. DC. [= *B. pleiopetala*], *B. tenuicaulis* [= *B. pleiopetala*] y *B. warburgiana* Hieron. [= *B. pleiopetala*].

Key words: Argentina, *Begonia*, Bolivia, Cajamarca, IUCN Red List, Peru, Santa Cruz.

Two new species of *Begonia* L. were identified during an ongoing monographic study of *Begonia* sect. *Eupetalum* (Lindl.) A. DC., which comprises an estimated 40 species. The members of this section together with *B. boliviensis* A. DC. of section *Barya* (Klotzsch) A. DC. form a monophyletic group (Tebbitt & Stuart, unpub.), which are often referred to colloquially as the tuberos begonias on account of their tuberos rootstocks, unique among Andean *Begonia*. The two new species described here along with eight other species, viz. *B. aequatorialis* L. B. Sm. & B. G. Schub., *B. anemoniflora* Irmsch., *B. octopetala* L'Hér., *B. pleiopetala* A. DC., *B. polypetala* A. DC., *B. rosacea* Putz., *B. rubricaulis* Hook., and *B. tumbezensis* Irmsch., constitute an informal group within *Begonia* sect. *Eupetalum*. This species group can be distinguished from the remainder of *Begonia* sect. *Eupetalum* by virtue of having a combination of multifid (vs. bifid) styles, symmetric leaf blades, an acaulous habit, and, in most members of the group, more asymmetric ovary wings and a tendency to have more numerous tepals (up to 12 tepals in the male flowers vs. up to six and up to 11 tepals in the female flowers vs. up to six). Several members of this species group share greatest morphological similarity with *B. octopetala*, which is a widespread and variable taxon found in both Ecuador and Peru. Many of these species also have distributions that are parapatric with *B. octopetala* and accordingly may represent segregate species derived from it. This group is informally referred to herein as the *B. octopetala* species group.

Begonia pseudopleiopetala Tebbitt, as described herein, was originally identified as a new species, following an extensive herbarium-based study of Andean *Begonia*. Several of the specimens of this species were previously misidentified as *B. pleiope-*

tala. *Begonia pleiopetala* is widespread and locally common in the Andes of Peru (Tumbes, Huánuco, Huancavelica, Cusco, Puno regions) and northern Bolivia (La Paz Department), while *B. pseudopleiopetala* apparently has a much more restricted distribution being known from only a few collections made in the vicinity of Contumazá, Peru (Cajamarca region), and from a single collection made near Huancabamba, Peru (Piura region). The two species are morphologically similar and likely represent sister species. Parallel descriptions of both species are provided herein for comparison. Smith and Schubert (1945) list *B. pusilla* A. DC. and *B. warburgiana* Hieron. as synonyms of *B. pleiopetala* but with question marks before their names. Barkley and

Golding (1974), based on this citation, included both these taxa as unquestionable synonyms of *B. pleiopetala*, a practice that latter authors (e.g., Golding & Wasshausen, 2002) have followed. Study of herbarium material found that *B. pusilla* and *B. warburgiana*, as well as *B. gracillima* A. DC. and *B. tenuicaulis* A. DC., are morphologically supported as taxonomic synonyms of *B. pleiopetala*. The second new species, *B. marinae* Tebbitt, was identified during fieldwork conducted in Bolivia during January 2012 and 2013. It, too, is likely most closely related to *B. pleiopetala*. To aid identification of these poorly studied *Begonia*, a key to the *B. octopetala* species group is provided.

KEY TO *BEGONIA OCTOPETALA* SPECIES GROUP OF ANDEAN SOUTH AMERICA

Organ lengths are here measured from the apex of an organ to its point of attachment. Width is measured as the distance from one side of an organ to the other at its widest part.

- 1a. Margin of 2 outermost tepals of male (and often also female) flowers denticulate or ciliate-denticulate; male tepals 4 to 6 2
 - 2a. Leaf adaxial surface glabrous; bract margin ciliate-dentate or laciniate-dentate toward the apex; female tepals five, 0.9–2.5 cm long; Ecuador (Loja) and Peru (Tumbes, Cajamarca, La Libertad) *B. tumbezensis* Irmsch.
 - 2b. Leaf adaxial surface with a sparse to dense cover of short hairs; bract margin usually entire, rarely sparsely fimbriate along the entire length; female tepals usually 6, occasionally five, 0.5–1 cm long; eastern Andean Venezuela and Colombia *B. rosacea* Putz.
- 1b. Margin of 2 outermost tepals of male and female flowers entire; male tepals 4 to 11 3
 - 3a. Leaf undersurfaces, petioles, peduncles, pedicels, and ovaries covered with white reflective hairs, often densely so 4
 - 4a. Plant surfaces canescent-pubescent; leaf blade deltoid; tepals blood red, apex usually acute or rarely obtuse, never emarginate; northern Andean Peru (Piura) *B. polypetala* A. DC.
 - 4b. Plant surfaces tomentose; leaf blade broadly ovate to orbicular or subreniform; tepals white or pink, apex obtuse and sometimes distinctly emarginate 5
 - 5a. Male tepals (6)7 or 8, uniformly bright pink, apex obtuse but never emarginate; leaf blade 3.5–16 × 3.5–13 cm; ovary with 2 prominent bracteoles situated at its base; Andean Bolivia (La Paz, Chuquisaca, Santa Cruz, and Tarija) and Argentina (Salta) *B. marinae* Tebbitt
 - 5b. Male tepals 10 or 11, outermost pink, innermost white, apex obtuse and distinctly emarginate; leaf blade 2.3–4.3 × 3.2–6.5 cm; ovary lacking bracteoles; central Andean Peru (Pasco, Junin) *B. anemoniflora* Irmsch.
 - 3b. Leaf undersurfaces, petioles, peduncles, pedicels, and ovaries glabrous to pubescent, hairs (when present) not forming a white reflective surface 6
 - 6a. Inflorescence symmetric to subsymmetric, once- or twice-branched; leaf blade 6.5–27 cm wide; outermost tepals of male flowers 0.5–2.7 cm wide 7
 - 7a. Innermost whorl of male tepals spatulate; female tepals 6 or 7; western Andean Ecuador to central Andean Peru and coastal lomas of northern Peru *B. octopetala* L'Hér.
 - 7b. Innermost whorl of male tepals broadly elliptic to elliptic or ovate; female tepals 5 or 6; northeastern Andean Argentina *B. rubricaulis* Hook.
 - 6b. Inflorescence asymmetric, unbranched; leaf blade 1.5–13 cm wide; outermost tepals of male flowers 0.3–1.1 cm wide 8
 - 8a. Apex of leaf blade abruptly acuminate; anther connective never projecting beyond the thecae; female tepals 5; western Andean Peru (Cajamarca and Piura) *B. pseudopleiopetala* Tebbitt
 - 8b. Apex of leaf blade acute to obtuse; anther connective usually projecting beyond the thecae, occasionally not projecting beyond the thecae; female tepals 6 to 9 9
 - 9a. Leaf blade triangular-ovate; female tepals 6; central and southern Andean Ecuador and northern Andean Peru *B. aequatorialis* L. B. Sm. & B. G. Schub.
 - 9b. Leaf blade ovate to orbicular; female tepals 7 to 9; Andean Peru and northern Andean Bolivia *B. pleiopetala* A. DC.

TAXONOMIC TREATMENT OF THE *BEGONIA OCTOPETALA*
GROUP, PRO PARTE

1. *Begonia marinae* Tebbitt, sp. nov. TYPE: Bolivia.

Santa Cruz: Vallegrande, rd. from Pucara to Alto Seco, N & NE facing open slopes in remnant Tucomano forest, 18°44'S, 64°06'W, 2727 m, 12 Jan. 2012, *M. C. Tebbitt 724* (holotype, USZ; isotypes, USZ [2]). Figure 1.

Diagnosis. Related to *Begonia pleiopetala* A. DC., but differs especially by the leaf blades with a dense cover of white tomentose hairs adaxially, tepals bright pink (vs. white or pale pink), tepals broader in the male flowers (1.3–2.2 vs. 0.15–0.8 [–1.1] cm), and ovaries with two prominent bracteoles and a larger body (0.8–1 × 0.75–1.2 vs. 0.3–0.7 × 0.3–0.55 cm).

Acaulous tuberous herb; tuber ellipsoid, 3.5–8 cm diam., 2–4 cm tall; stipules persistent, membranous, ovate to oblong-ovate, 1–2 × 0.8–1.5 cm, apex rounded, shortly aristate, margin entire. Leaves 1 to 3, alternate, arising toward one end of tuber, basifixed; petiole orientated in same direction as main vein of blade, 4–12 cm, pale green and often developing a reddish tinge in proximal half, covered with dense, short white-tomentose hairs; blades ± symmetric, orbicular to ovate-orbicular, 3.5–16 × 3.5–13 cm, apex acute or obscure, base ± symmetric, cordate, basal lobes overlapping or not and then to 1 cm apart, sinus 2–5.5 cm deep, margin dentate, teeth triangular, 2–10 mm, ciliate, adaxial blade surface pale green, sparse to moderate indument of short white-downy hairs, abaxial blade surface pale green but coloration obscured by dense indument of short white-tomentose hairs, veins palmate, impressed on adaxial surface, slightly raised on abaxial surface, (6 to)9. Inflorescences 1 or 2, erect, bisexual, asymmetric, cymose, usually bearing 2 male and 2 female flowers; peduncle reddish green, 14–34 cm, moderately to densely covered with white-tomentose hairs; pedicels of male flowers 2–6.8 cm, color and indument as in peduncle; pedicels of female flowers 1.5–5.2 cm, color and indument as in peduncle; bracts persistent, pink when young but soon becoming brown and dry, narrowly ovate to narrowly oblong-ovate, 1–2.3 × 0.4–0.8 cm, apex acute, margin entire, outer surfaces with a moderate covering of white-tomentose hairs, inner surfaces glabrous. Male flowers with tepals spreading, (6)7 or 8, bright pink, outer pair elliptic, 2–2.6 × 1.3–2.2 cm, apex obtuse, folded longitudinally and somewhat U-shaped in cross-section, base rounded, margin entire, outer surfaces of outermost pair of tepals sparsely to moderately white-tomentose, inner surfaces gla-

brous, inner 5 or 6 tepals spatulate, 2.2–3 × 1–1.7 cm, apex obtuse, folded longitudinally and somewhat U-shaped in cross-section, base attenuate, margin entire; stamens yellow, ca. 200, attached along length of a ca. 5 mm tall torus; filaments 2–3 mm; anthers obovate, ca. 1 mm, dehiscent via short lateral slits, connective not projecting, symmetrically basifixed to filaments. Female flowers with 2 bracteoles, both situated at ovary base but one bracteole inserted slightly lower than the other and this proximal bracteole also slightly larger in size, bracteoles pink when young becoming brown, ovate, elliptic-obovate or elliptic-ovate, 8–10 × 4.5–10 mm, outer surfaces moderately tomentose, with short, white hairs, inner surfaces glabrous, tepals persisting in fruit, spreading, 6 to 11, color similar to male tepals, outer surfaces with a moderate covering of white-tomentose hairs, inner surfaces glabrous, outer 3 tepals elliptic to broadly obovate, 1.5–2 × 1–1.6 cm, apex obtuse, base attenuate, margin entire, inner 3 to 8 tepals broadly obovate to elliptic, 1.5–1.6 × 1–2.6 cm, apex obtuse, base attenuate, margin entire, both surfaces glabrous; ovary body ± orbicular, 0.8–1 × 0.75–1.2 cm, densely white-tomentose, 3-winged, one wing slightly longer than the other two, longest wing narrowly triangular, front edge of wing truncate, apex obtuse, 0.1–1(–2.5) cm tall, 0.75–1.1 cm broad, shorter wings riblike, to 5 mm tall, ovary 3-locular, placentas axile, bifid; ovules arranged on both surfaces; styles 3, ca. 6 mm tall, yellow, shortly fused at the base, multifid, branches somewhat erect, with stigmatic papillae in a spirally twisted band toward ends of style branches. Fruit a capsule, densely covered with white-tomentose hairs, similar in shape and size to ovary.

Distribution and ecology. *Begonia marinae* is scattered but often locally abundant in Bolivia's eastern Chuquisaca Department and neighboring Santa Cruz, as well as in southeastern La Paz and southern Tarija. In the latter department, the species occurs along the western edge of the Reserva Nacional de Flora y Fauna, Tariquía, and along the Cuesta de Sama in the Reserva Biológica de la Cordillera de Sama. The species is also known from two collections from Argentina's Salta Province.

In Bolivia, plants of *Begonia marinae* were observed as growing on open, grassy slopes, often amongst remnant Tucomano forest, at altitudes of 2200–3600 m. I have not observed wild populations in Argentina, but the species is recorded to grow there at 3500–3600 m (*Sleumer 3815*) and likely occurs in similar habitat.

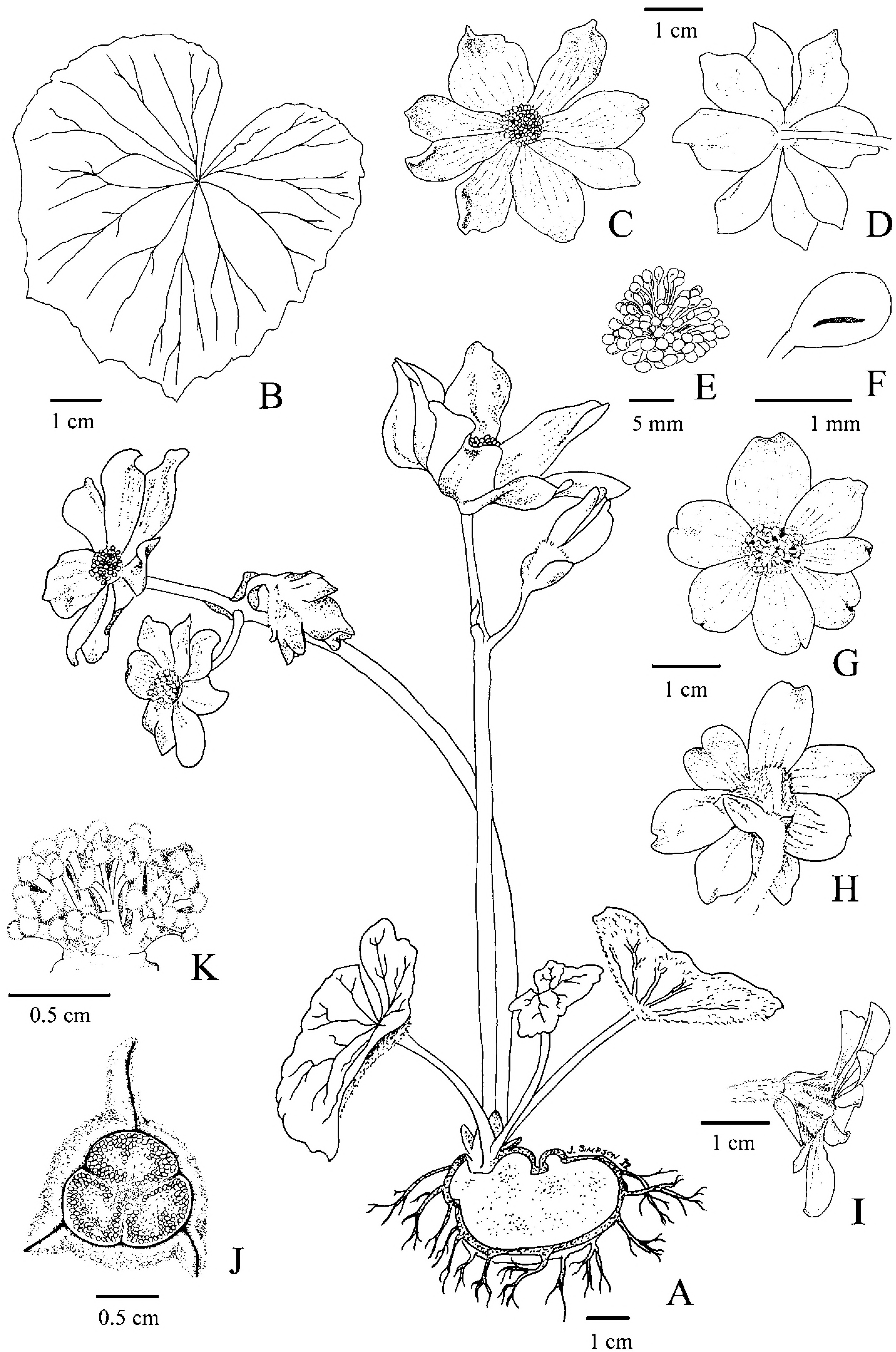


Figure 1. *Begonia marinae* Tebbitt. —A. Habit. —B. Leaf blade. —C. Male flower, front view. —D. Male flower, rear view. —E. Androecium. —F. Stamen. —G. Female flower, front view. —H. Female flower, rear view. —I. Female flower, side view. —J. Ovary cross-section. Style and stigma. —K. Style and stigma. Drawn by Johnathyn Simpson, from *Tebbitt 716* (USZ).

IUCN Red List category. *Begonia marinae* is assessed as of Least Concern (LC), according to IUCN criteria (2010).

Phenology. *Begonia marinae* was collected in flower from January to July.

Etymology. The specific epithet makes reference to Saint Marina the Monk (6th century) who from childhood to her time of death disguised herself as a monk so that she could live in a monastery. The female flowers of *Begonia* similarly mimic male flowers. *Begonia* are monoecious or dioecious, and most have female flowers with prominent bifid styles that mimic the androecium of the male flowers. This mimicry extends to both the shape and color of the styles, and since the female flowers do not provide rewards, this resemblance may deceive pollinators into visiting them (Schemske & Ågren, 1995; Schemske et al., 1996; Le Corff et al., 1998). The styles of this new species, like other members of the *B. octopetala* species group, are multifid, but are more highly dissected than other members of this group and as a result show a particularly close mimicry to the androecium.

Taxonomic notes. *Begonia marinae* is morphologically most similar to *B. pleiopetala*, typically sharing an orbicular to ovate-orbicular leaf blade with a dentate margin, as well as asymmetric inflorescences. The new species, however, differs in several respects. For example, the leaf blades of *B. marinae* are usually larger (3.5–16 cm long vs. 1.3–9 cm long in *B. pleiopetala*) and are prominently covered with white-tomentose hairs on their lower surfaces (vs. a sparse to moderate cover of pilose hairs or glabrous in *B. pleiopetala*). Similarly, *B. marinae* has tepals that are bright pink (vs. white or pale pink in *B. pleiopetala*). The tepals of *B. marinae* are also broader (in male tepals 1.3–2.2 cm wide vs. 0.15–0.8[–1.1] cm wide in *B. pleiopetala*). The two species typically also differ in tepal number, with *B. marinae* having (six) seven or eight tepals in male flowers and six to 11 tepals in female flowers (vs. usually eight to 10 tepals [as few as five in depauperate specimens] in male flowers and seven to nine tepals in female flowers in *B. pleiopetala*). Lastly, the ovaries of *B. marinae* have two prominent bracteoles at their base (while those of *B. pleiopetala* lack bracteoles), and the ovary body itself is larger (0.8–1 × 0.75–1.2 cm vs. 0.3–0.7 × 0.3–0.55 cm in *B. pleiopetala*). Color photographs of two collections of *B. marinae*, Tebbitt 720 and Tebbitt 758 (USZ), appear in Tebbitt (2012, 2013).

In Santa Cruz, *Begonia marinae* was observed growing alongside *B. krystofii* Halda, *B. micranthera* Griseb., *B. tominana* Golding, and an undescribed *Begonia* species, all of which belong to *Begonia* sect. *Eupetalum* but not to the *B. octopetala* species group. A single putative hybrid (Tebbitt 717, USZ) between *B. tominana* and *B. marinae* was observed at one of these sites. *Begonia marinae* did not appear to hybridize with the other three species found in this area, even though they were observed to all flower at the same time. In the eastern margin of the Tariquia Flora and Fauna National Reserve, the species commonly grows alongside *B. micranthera* but does not appear to hybridize with this species.

Paratypes. ARGENTINA. **Salta:** s. loc., *E. Petersen & J. P. Hjerting 1171* (C); Station Victoria, entre Abre de Peña Negra y Abra de San José, 7 Feb. 1953, *H. Sleumer 3815* (US). BOLIVIA. **Chuquisaca:** Zudañez, Redencion Pampa, ca. 3 km de la comunidad, sect. Ichuloma, 18°49'S, 64°34'W, 23 Apr. 2011, *J. Gutiérrez 1634* (HSB); Jaime Zudañez, S de Icla, Cordillaria de Mandinga (Sombreros), 19°25'S, 64°41'S, 16 Jan. 2013, *M. C. Tebbitt 758* (USZ); Tomina, en la parte superior de un pequeño acantilado hierba a pocos metros de la carr., ca. 7 km por carretera de Tomina hacia Villa Serrano, 19°08'S, 64°24'W, 5 Jan. 2013, *M. C. Tebbitt 743* (USZ); Sud Cinti, Puca Pampa, ca. 7.5 km de Puseto ganadero, al SW, 20°46'S, 64°34'W, 2 Dec. 2004, *J. Gutierrez, H. Huaylla, A. Lliully, R. León, I. Guachalla & E. Portal 591* (HSB, MO). **La Paz:** Inquisivi, carabuco along rd. betw. Choquetanga & Carabuco Power Station & for 0.5 km N along E bank of Rio Miguillas from Carabuco Power Station, 1–2.5 km N of Choquetanga, 16°50'S, 67°19'W, 28 Jan. 1989, *M. Lewis 37044* (LPB, MO). **Santa Cruz:** Vallegrande, Rota del Ché betw. Vallegrande & Pucara, 18°35'S, 64°06'W, 11 Jan. 2012, *M. C. Tebbitt 720* (USZ); Vallegrande, Rota del Ché betw. Vallegrande & Pucara, 11 Jan. 2012, *M. C. Tebbitt 716* (MO, USZ). **Tarija:** Arce, Mpio. Padcaya, Reserva Nac. de Flora y Fauna Tariquia, 21°54'S, 64°33'W, 3 July 2005, *M. Serrano, J. Villalobos & A. Lliully 6085* (MO); Acre, entrado por el Rio Carbonejo, Exp. S. Incl. 30°, Bosque de Aliso, 3 Feb. 1988, *M. Liberman 2000* (US).

2. *Begonia octopetala* L'Hér., Stirp. Nov. [fasc. 4]: 101. 1788. *Begonia grandiflora* Knowles & Wescott, Fl. Cab. 1: 51, t. 25. 1837. *Huszia octopetala* (L'Hér.) Klotzsch, Monatsber. Königl. Preuss. Akad. Wiss. Berlin, 121. 1854. TYPE: Peru. Lima, *J. Dombey s.n.* (holotype, P).

Leaf blades ovate, or almost orbicular, or deltoid, 6–17 × 6.5–22 cm, abaxial blade surface sparsely to densely pubescent, hairs never forming a white reflective surface, blade margin usually shortly triangular-lobed, lobes to 2.5 cm deep. Male flowers with tepals 6 or 7 to 10, spreading, outer pair of tepals ovate or obovate, 1.2–3.2 × 0.5–2.7 cm, tepal margin entire, inner 5 to 8 tepals spatulate, 1.2–3.2 × 0.5–2.7 cm, tepal margin entire; anthers oblong to

oblong-obovate, connectives not projecting, slightly asymmetrically basifixed. Female flowers with bracteoles absent; tepals 6 or 7, spreading, tepal margin entire.

KEY TO *BEGONIA OCTOPETALA* INFRASPECIFIC TAXA

- 1a. Leaf blade ovate, or almost orbicular; male tepals 7 to 10; female tepals 6; fruit wing to 3.5 cm long; eastern Andes of Ecuador and Peru and coastal lomas of Peru 2a. *B. octopetala* subsp. *octopetala*
- 1b. Leaf blade deltoid; male tepals 6; female tepals 7; fruit wing to 4 cm long; eastern Andes of central Peru 2b. *B. octopetala* subsp. *ovatiformis*

2a. *Begonia octopetala* L'Hér. subsp. *octopetala*

Phenology. Throughout most of its distributional range, *Begonia octopetala* subsp. *octopetala* has been collected in flower from March to July, but in the lomas formations of northern Peru (Lima, La Libertad), it has been collected in flower from July to October and rarely into November.

Distribution and ecology. *Begonia octopetala* subsp. *octopetala* is a widespread and locally common taxon that occurs on the western side of the Andean mountains of Ecuador (Cotopaxi, Pastaza, Bolivar, Chimborazo, Cañar, Azuay, Loja) and northern Peru (Piura, Cajamarca, La Libertad, Ancash, Lima) at altitudes between 1800 and 3300 m. It occupies open or scrub-covered rocky slopes and pasture land and rocky montane forest, in both seasonally dry areas and in more mesic areas. *Begonia octopetala* subsp. *octopetala* also occurs in the lomas formations of northern Peru (La Libertad, Lima) at altitudes of 170–730 m. Here it grows on open or scrub-covered, west-facing slopes, often toward the crest of the hills, and is found in full sun or the shade of rocks or shrubs, usually in well-drained, humusy soils, and often in rock crevices.

2b. *Begonia octopetala* L'Hér. subsp. *ovatiformis* Irmsch., Bot. Jahrb. Syst. 76: 75. 1953. TYPE: Peru. Huacachi, estacion near Muña, 6500 ft., 20 May 1923, *J. F. Macbride 4143* (holotype, F; isotype, B).

Distribution and ecology. *Begonia octopetala* subsp. *ovatiformis* is known from a single collection made in central Peru (Huanuco), where it is found on moist rock ledges, and shaded rocky cliffs between 1800 and 1980 m.

Phenology. *Begonia octopetala* subsp. *ovatiformis* has been collected in flower in May.

3. *Begonia pleiopetala* A. DC., Ann. Sci. Nat., Bot., sér. 4, 11: 121. 1859. TYPE: Peru. Andibus, s.d., *J. McLean s.n.* (holotype, K [barcode] 000252037).

Begonia gracillima A. DC., Ann. Sci. Nat., Bot., sér. 4, 11: 120, 1859, syn. nov. TYPE: Bolivia. s. loc., 1839–1840, *C. Gay s.n.* (lectotype, designated here, P [barcode] 00482219, P photo at F; isolectotype, G-DC).

Begonia pusilla A. DC., Ann. Sci. Nat., Bot., sér. 4, 11: 120. 1859. TYPE: Bolivia. Prov. De Yungas, Dec. 1846, *H. A. Weddell 4215* (lectotype, designated here, G-DC, G-DC photo at F; isolectotype, P [barcode] 00482207, P photo at F).

Begonia tenuicaulis A. DC., Ann. Sci. Nat., Bot., sér. 4, 11: 120. 1859, syn. nov. TYPE: Bolivia. Prov. De Larecaja et Caupolican (vallées entre Tipoani et Apolobamba, May 1847, *H. A. Weddell 4592* (lectotype, designated here, P [barcode] 00482211, P photo at F; isolectotype, G-DC).

Begonia warburgiana Hieron., Bot. Jahrb. Syst. 21: 325. 1895. TYPE: Bolivia. Illimani, entre Pongo y Apacheta, 3800 m, 17 Dec. 1876, *A. Stübel 24b* (lectotype, designated here, B [barcode] 10 0186583; isolectotype, B [barcode] 10 0186583).

Acaulous herb, with a tuber-like rhizome; rhizome growing in a horizontal plane just below the surface of the substrate, to 5 cm long, 0.3–1 cm diam., unbranched; stipules persistent, membranous, triangular-ovate to ovate, 2.5–15 × 1–8 mm, apex acute, aristate, margin entire. Leaves 1 to 4, alternate, arising from apical portion of rhizome, basifixed; petiole ± oriented in same direction as main vein of blade, 1.5–18.5 cm, usually densely to moderately villous to tomentose in upper half and sparsely villous in lower half, occasionally sparsely villous along entire length; blades usually symmetric but occasionally asymmetric, ovate to orbicular, 1.3–9 × 1.5–11.5 cm, apex acute to obtuse, base cordate or obliquely cordate, lobes rounded, not overlapping, sinus 0.3–4 cm deep, margin with triangular to crenate teeth, teeth tipped with short hair, margin sometimes also lobulate, lobules 2–8 mm deep, adaxial blade surface green, usually with a moderate to dense cover of pilose hairs or occasionally glabrous, abaxial blade surface usually with a moderate to dense cover of pilose hairs along the main veins and elsewhere hairs absent or sparse, or occasionally glabrous throughout, veins palmate, 6 to 8. Inflorescences 1 to 3, axillary in apical portion of rhizome, erect, asymmetric, cymose, unbranched, bearing 2 to 5 flowers, with up to 3 male or 3 female flowers, proximalmost flower usually female; peduncle red, 3.5–30 cm, sparsely to densely villous,

sometimes gradually becoming almost glabrous in lower half; pedicels of male flowers red, 0.6–4.5 cm, sparsely to densely tomentose; pedicels of female flowers red, 0.4–3 cm, sparsely to densely tomentose; bracts persistent, ovate, 2–13 × 0.75–5 mm, apex acute, margin entire. Male flowers with the tepals spreading, usually 8 to 10 but as few as 5 (in depauperate plants in the southern part of the species' range, e.g., *Weddell 4215*), 4–19(–23) × 1.5–8(–11) mm, white to pink, outer surfaces of outermost tepals with wavy pilose hairs, which are moderate to dense at the bases and increasingly sparse toward apices, narrowly elliptic to narrowly obovate, subequal, apex obtuse, base usually tapering, occasionally rounded, margin entire; stamens 20 to 90, arranged on and around a raised receptacle or attached along the length of a 1–1.5 mm tall torus and also around base of torus; filaments 1.5–2 mm; anthers narrowly elliptic to oblong, 0.75–1.75 mm, dehiscing via lateral slits, connective usually shortly projecting to 0.25 mm, occasionally not projecting, symmetrically basifixed to filaments. Female flowers with bracteoles absent; tepals persisting in fruit, spreading, seven to nine, 3–14 × 1–6 mm, white to pink, otherwise similar to male flowers; ovary body broadly obovate to suborbicular, 3–7 × 3–5.5 mm, glabrous to pubescent, often with 1 wing on the dorsal edge and 2 angles, or 3-angled and wingless, when present, wing is ligulate-triangular, to 1 cm tall, front edge often truncate and slanted over styles or slightly concave and curved over styles, rear edge slightly convexly rounded, apex acute to somewhat obtuse; 3-locular, placentas axile, bifid, ovules arranged on both surfaces; styles three, 1.25–5 mm tall, shortly fused at base, multifid, branches erect, stigmatic papillae arranged in spiral bands along the branches. Fruiting peduncle to 30 cm; fruiting pedicel to 3.5 cm, subnutant; fruit a capsule, body broadly obovate to suborbicular, to 1.1 × 1 cm, glabrous to pubescent, 1-winged, wing triangular, to 1.5 cm tall, apex acute.

Distribution and ecology. *Begonia pleiopetala* is known to be widespread and locally common in Andean Peru (Piura, Huánuco, Huancavelica, Ayacucho, Apurimac, Cusco, Puno) and northern Bolivia (La Paz), usually between 2200 and 3750 m, but occasionally down to 1900 m. This species has been collected in humid places, usually next to sheltering rocks or boulders, in a variety of soils and in full sun or shade. It has been noted as often growing on open slopes, but is also found in thickets and on ancient rockwork.

It is interesting to note that *Begonia pleiopetala* has been collected at altitudes up to 3750 m in Bolivia, for example, at Lagunillas (La Paz; *Brooke 6162*),

which is close to the upper elevational limit for the family. Within the Begoniaceae, only *B. veitchii* Hook. f. of Peru and *B. tafiensis* Lillo of Argentina, which have been recorded up to 3800 and 4000 m, respectively, occur at higher elevations.

IUCN Red List category. *Begonia pleiopetala* is assessed as Least Concern (LC), according to IUCN criteria (2010).

Phenology. Throughout most of its distributional range, *Begonia pleiopetala* has been collected in flower from December to May and rarely into early June. In the eastern Andes of Peru (Cusco, Puna) and on occasion in the neighboring part of La Paz, Bolivia (*Rusby 682*), flowering was noted from October to November.

Etymology. The specific epithet refers to the relatively numerous tepals of both the male and female flowers compared to those of most members of the genus, beyond the *Begonia octopetala* species group.

Taxonomic notes. *Begonia pleiopetala* is morphologically most similar to *B. octopetala*, as well as the two species newly described here. *Begonia pleiopetala* and *B. octopetala* may be readily distinguished from one another by the shape of their anthers. In *B. pleiopetala*, the anthers are symmetrically attached to the filament and are usually narrowly oblong with more or less projecting connectives. However, in larger plants from the northern part of the species' range (e.g., *A. Weberbauer 6026*) the connectives may not project. In *B. octopetala*, they are asymmetrically attached to the filament and are wider, oblong to oblong-obovate and always lack projecting connectives. *Begonia pleiopetala* is also consistently smaller in almost all of its vegetative and floral parts compared to *B. octopetala*, is often found at higher altitudes, and has a more southern and eastern distribution than *B. octopetala*.

Begonia pleiopetala shows a rough morphological cline from larger to smaller plants from north to south within its distributional range. Imscher annotated the larger northernmost specimens of this species (all housed at F, e.g., *A. Weberbauer 6026*) as *B. pleiopetala* var. *occidentalis* nom. ined. but never published this name. Perhaps this was because size is the only difference and no clear-cut distinction could be made between northern and southern populations in the Peruvian Andes. The smallest specimen observed in the current study was the type of *B. pusilla*, while three other collections, which are almost as small and also unusual (but not unprece-

dented) in having both short hairs on the leaves and relatively fewer tepals, are the types of *B. tenuicaulis*, *B. gracillima*, and *B. warburgiana*. All four of these smaller collections are here considered synonymous with *B. pleiopetala* and fall within the quantitative variability for the taxon. Smith and Schubert (1941: 191) previously commented that the type of *B. gracillima* “may be only a depauperate form of *B. pleiopetala*.”

In the original description of *Begonia gracillima* (de Candolle, 1859), a single collection, *Gay s.n.*, is cited and is, therefore, the type of this taxon. Specimens of this collection, mistakenly annotated by de Candolle as *B. gracilis* A. DC., are located both in G-DC and in P. In his original publication of the species, de Candolle (1859) did not include a herbarium locality for this collection but in a later publication (de Candolle, 1864) cited the specimen in P. Accordingly, the P specimen of *Gay s.n.* is here designated as the lectotype of *B. gracillima*, while the specimen at G-DC is the isolectotype.

In the original description of *Begonia pusilla*, two syntypes are cited, representing collections by Weddell and Bridges. Specimens of the Weddell collection, located at P and G-DC, and the Bridges collection, located at BM and CGE, are both annotated by de Candolle as *B. pusilla*. The G-DC specimen in addition uniquely bears a short handwritten description of the new species by de Candolle. The G-DC specimen of *Weddell 4215* is here accordingly designated as the lectotype of *B. pusilla*, while the specimen at P is the isolectotype.

In the original description of *Begonia tenuicaulis* (de Candolle, 1859), a single collection made by Weddell, is cited and is, therefore, the type of this taxon. Specimens of this collection are located both in G-DC and in P. In his original publication of the species, de Candolle (1859) did not include a herbarium locality for the Weddell specimen but in a later publication (de Candolle, 1864) cited the specimen in P. Accordingly the P specimen of *Weddell 4592* is here designated as the lectotype of *B. tenuicaulis*, while the specimen at G-DC is the isolectotype. A mounted photograph of the lectotype is located at F.

There are two sheets at B, with “*Begonia warburgiana* Hieron. nov. spec.” annotated in hand similarly, which match the description of the type of this taxon as cited by Hieronymus (1896: 325). Both sheets are currently labeled as type and carry the same barcode, B 10 0186583. The botanical code (McNeill et al., 2012, Art. 8.2 and 8.3), however, states that a type should consist of a single specimen consisting of a single herbarium sheet, unless

multiple sheets are labeled as being part of the same specimen. Since there is no indication that the two sheets are part of the same specimen, the sheet of *Stübel 24b* bearing a plastic envelope is designated here as the lectotype, while the second sheet bearing a white paper envelope is the isolectotype.

Additional specimens examined. BOLIVIA. s. loc., 1846, *T. Bridges s.n.* (BM, CGE). **La Paz:** Franz Tamayo, ANMI, Apolobamba, Keara Viejo, 14°42'S, 69°04'W, 14 Apr. 2006, *A. F. Fuentes et al.* 9795 (MO); Franz Tamayo, ANMI, Apolobamba, Pelechuco camino rio abajo hacia Piara, 14°48'S, 69°02'W, 17 Apr. 2006, *A. F. Fuentes et al.* 10020 (MO); Murillo, Valle del rio Zongo, 16°09'S, 68°07'W, 14 Apr. 1987, *J. C. Solomon 16487* (MO); Nor Yungas, 36 km NE of Puesto de Transito (La Paz) on rd. to Unduavi, below Rinconada, 16°20'S, 67°58'W, 22 Feb. 1980, *J. C. Solomon 5035* (MO); Sur Yungas, El Chaco, 2 Dec. 1920, *E. Asplund 1318* (S); Unduavi, 16 Dec. 1920, *E. Asplund 1808* (S); La Paz–Coroico rd., Km. 35, 11 Dec. 1980, *H. Balslev 1130* (NY); Murillo, Valle de Zongo, Ceja de la montaña, 12 Jan. 1980, *G. Beck 2753* (LPB, US); Murillo, Pongo, de la cumber 14 km, hacia Unduavi, 4 Mar. 1981, *G. Beck 4644* (US); Lagunillas, over mtn. range behind Choro in St. Elena Valley, 6 Mar. 1950, *W. M. A. Brooke 6162* (BM, F, NY, S, US); Unduavi, 12 Feb. 1907, *O. Buchtien 126* (NY); *O. Buchtien 653* (GH, US, W); *O. Buchtien 4056* (NY); Murillo, Kanton Zongo, Zongotal, Weide 33 km oberhalb des Straßendendes (in dieser Höhe kein Ackerbau), 23 Feb. 1980, *J. Krach 8704* (GH); Unduavi, Oct. 1885, *H. H. Rusby 682* (BM, F, GH, K, NY, US); Pongo, 17 Feb.–1 Mar. 1926, *G. H. Tate 273* (NY); Murillo, Zongo Valley, 7 Apr. 2002, *J. R. I. Wood et al.* 18044 (K). PERU. s. loc., s.d., *J. Soukup 1226* (F). **Apurimac:** Abancay, 18.6 km from Abancay on rd. from Cuzco, 17 Apr. 1971, *J. G. Hawkes et al.* 5214 (C [2]). **Ayacucho:** Cangallo, 2 km past Ocos on rd. to Ayacucho, 18 Apr. 1971, *J. G. Hawkes et al.* 5231 (C [3]). **Cusco:** Urubamba, Wiñayhuaya a Puyupata, s.d., *C. Ochoa 4* (MO); Cusco, La Convención, Distr. Huayopata, San Luis, 13°04'S, 072°23'W, 22 Mar. 2003, *G. Calatayud, I. Huamantupa, E. Suelli, J. Farfán, A. Carazas & Y. Vizcardo 1319* (MO); La Convención, Distr. Huayopata, sector Canchayoc, 13°07'S, 72°20'W, 21 Nov. 2006, *L. Valenzuela et al.* 8022 (MO); Urubamba, Distr. Machu Picchu, Wiñay Wayna, 13°13'S, 72°30'W, 21 Feb. 2003, *L. Valenzuela et al.* 1472 (MO). **Huancavelica:** Tayacaja, Montepungo Rd., E of Surcubamba, 13 Jan. 1939, *H. E. Stork & O. B. Horton 10376* (F, K); Huancavelica, Yauli, 11 Mar. 1939, *H. E. Stork & O. B. Horton 10861* (F, K). **Huánuco:** Santa Lusía, Cani, Pueblo 7 mi. NE of Mito, 16–26 Apr. 1923, *J. F. Macbride 3393* (F); 15 mi. SE of Huánuco, 31 May–3 June 1922, *J. F. Macbride & W. Featherstone 2129* (F). **Piura:** Huancabamba, above Palambla, Apr. 1912, *A. Weberbauer 6026* (F [2], GH, US). **Puno:** Sandia, Limbani, 17 Nov. 1938, *C. Vargas 1317* (F, GH, MO); Sandia, under rocks & on walls on slopes & ancient terraces of Limbani, 20 Nov. 1938, *C. Vargas 9632* (F, GH, MO [2], S).

4. *Begonia pseudopleiopetala* Tebbitt, sp. nov.
TYPE: Peru. Contumazá: ca. 20 km S of Contumazá, ca. 18 km above Cascas, 7°25'S, 78°25'W, 14 Apr. 1986, *M. O. Dillon, D. Dillon*

& *A. Sagástegui* 4528 (holotype, F; isotypes, GB, MO, US). Figure 2.

Diagnosis. Related to *Begonia pleiopetala* A. DC., but differs by having acuminate leaf tips (vs. acute to obtuse), obovate anthers (vs. narrowly elliptic to oblong), female flowers with only five tepals (vs. seven to nine), and anther connectives never projecting beyond the thecae (vs. usually prominently projecting past the thecae).

Acaulous herb, with a tuber-like rhizome; rhizome growing in a \pm horizontal plane, irregularly shaped, 0.8–1.3 cm long, ca. 0.5 cm in diam., unbranched; stipules persistent, membranous, ovate-triangular, 2–3 \times 1.5–2 mm, apex acuminate, aristate, margin entire. Leaves 1 to 3, alternate, arising from apical portion of rhizome, basifixed; petioles oriented in same direction as main vein of blade, 3.5–10.7(–50) cm, sparsely to densely pubescent; blades symmetric, ovate, 2–3.6(–5) \times 2.5–4.2(–6.5) cm, apex abruptly acuminate, base cordate, lobes equal, not overlapping, sinus 1–1.5 cm deep, margin denticulate to dentate, teeth 0.5–2 mm deep, glabrous or tipped with very short hairs, adaxial blade surface sparsely to densely pubescent, abaxial blade surface pubescent only along main veins, veins palmate, 5 to 6. Inflorescence solitary, axillary in apical portion of rhizome, erect, 2- to 5-flowered, asymmetric, cymose, with up to 3 female flowers and 2 male flowers, proximalmost flower female; peduncle 12–33(–65) cm, sparsely to densely pubescent; pedicels of male flowers 1.2–4 cm, pubescent, hairs often denser in distal half; pedicels of female flowers 0.7–3.2 cm, hairs as in male pedicels; bracts persistent, ovate or elliptic-ovate, 2.5–11 \times 1.75–8 mm, apex acute, margin entire, outer surfaces pubescent, inner surfaces glabrous. Male flowers with the tepals spreading, 7 or 8, white or rose pink, obovate, spatulate, or elliptic, 1.3–1.9 \times 0.5–1.1 cm, apex obtuse, base tapering, margin entire, outer surfaces sparsely to densely pubescent toward base; stamens ca. 100, attached along the length of a ca. 1 mm tall torus; filaments 1.5–3 mm; anthers obovate, ca. 1 mm, dehiscing via lateral slits, connectives not projecting, asymmetrically basifixed to filaments. Female flowers with bracteoles absent; tepals persisting in fruit, spreading, 5, white or rose pink, obovate or elliptic, 0.8–1.7 \times 0.25–0.7 cm, apex obtuse, base tapering, margin entire, glabrous throughout or outer surfaces pubescent; ovary body elliptic, 3–8 \times 2–7 mm, ovary body and wings sparsely to densely pubescent, unequally 3-winged, one wing much longer than other two, longest wing with a truncate front edge and rounded back edge, apex either obtuse or somewhat flattened and acute, 0.8–1.5 \times 0.5–1.05 cm, two smaller wings almost

absent to 0.3 \times 1 cm, usually triangular, with a truncate front edge and a straight rear edge, rarely ligulate; 3-locular, placentas axile, bifid, ovules arranged on both surfaces; styles three, 4–6 mm tall, multfid, branches \pm erect, stigmatic papillae in short spiraled bands at ends of style branches. Fruiting pedicels to 3.5 cm, subnutant; fruit a capsule, body obovate-elliptic, to 8 \times 7 mm, glabrous or sparsely pubescent, longest wing to 1.7 \times 1 cm, front edge of wing becoming slightly convex rounded, otherwise as in ovary, shorter wings as in ovary.

Distribution and ecology. *Begonia pseudopleiopetala* is apparently a narrow endemic since it is known from a few collections made in the vicinity of Contumazá, Peru (Cajamarca), at 2100–2500 m, and from a single collection made near Huancabamba, Peru (Piura), at 1300–1500 m. At both localities, plants were noted to grow in humid, montane forest. Fieldwork is, however, required to critically examine the distribution of this poorly known species.

IUCN Red List category. *Begonia pseudopleiopetala* is assessed as Data Deficient (DD), according to IUCN criteria (2010). More collections are required before this species can be further evaluated.

Phenology. The Cajamarca populations of *Begonia pseudopleiopetala* were collected in flower from April to June, while the single Piura collection was collected in flower in late March.

Etymology. The specific epithet refers to the similarities between this species and *Begonia pleiopetala*, a species with which it has been confused in the past.

Taxonomic notes. *Begonia pseudopleiopetala* is morphologically most similar to *B. pleiopetala*, typically having relatively small leaf blades and an asymmetric inflorescence. The new species differs by having acuminate leaf apices (vs. acute to obtuse in *B. pleiopetala*), obovate anthers (vs. narrowly elliptic to oblong in *B. pleiopetala*), female flowers with only five tepals (vs. seven to nine in *B. pleiopetala*), and by its anther connectives never projecting (vs. usually shortly projecting in *B. pleiopetala*). *Begonia pseudopleiopetala* also has a strikingly different flower to leaf ratio, with the flowers appearing relatively large compared to the species' small leaves. Where their distributions overlap, the two species grow at different altitudes, with *B. pseudopleiopetala* occurring at 1300–2500 m and *B. pleiopetala* at 2700–2800 m.

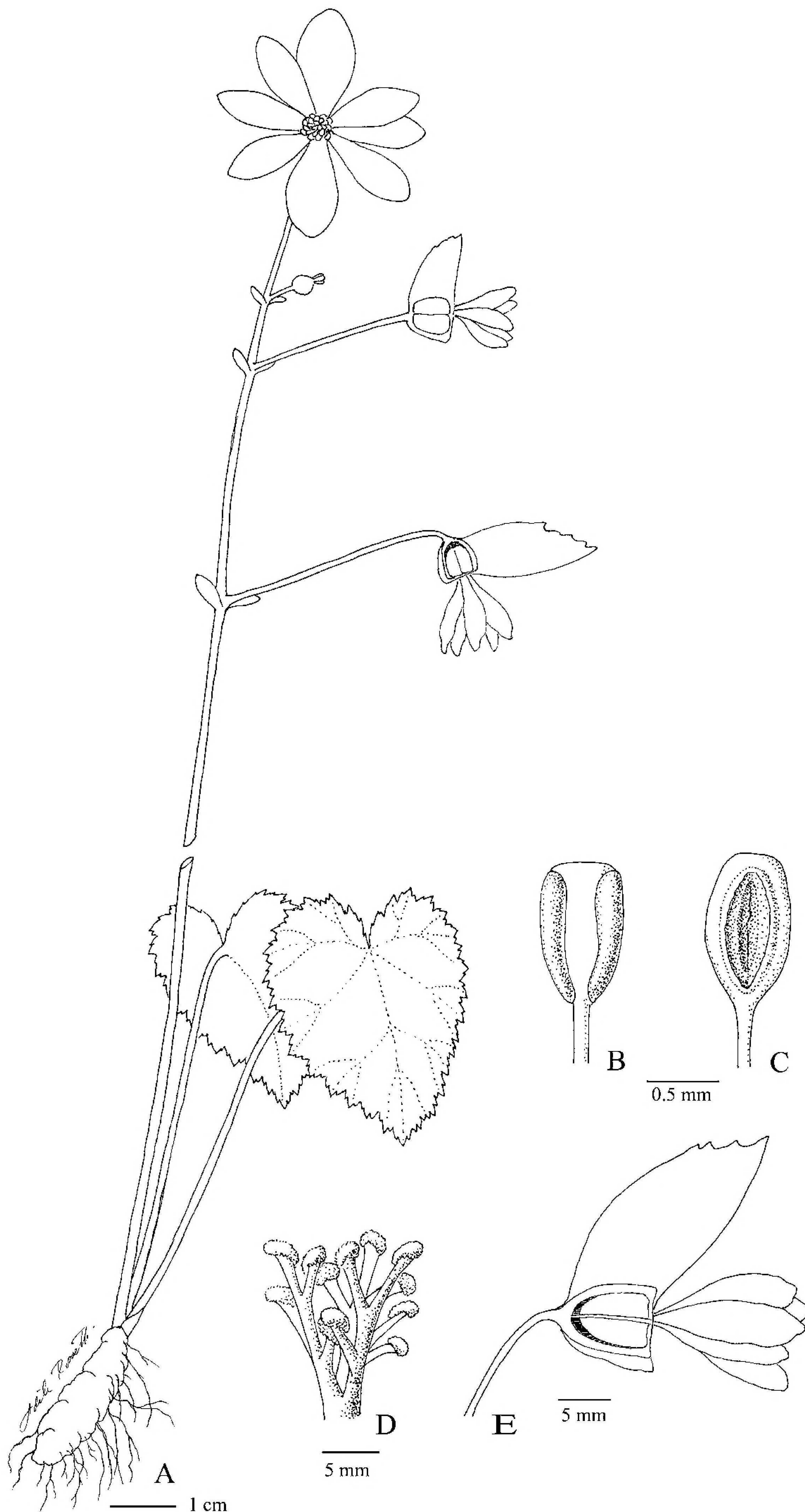


Figure 2. *Begonia pseudopleiopetala* Tebbitt. —A. Habit. —B. Stamen, front view. —C. Stamen, side view. —D. Styles and stigmas. —E. Fruit, side view. Drawn by Adèle Rossetti Morosini, from A. Sagástegui et al. 15405 (F).

Based on the limited collections available, *Begonia pseudopleiopetala* appears to have a disjunct distribution. The species has been collected on four separate occasions near Contumazá in Peru's Cajas

marca region, and once about 240 km to the north of this, near Huancabamba, in Peru's Piura region. Plants from these two areas differ slightly in their morphological features. The population from the

northernmost locality has rose-pink flowers (vs. white) and is more densely pubescent. I have, however, refrained from describing these apparently disjunct populations as infraspecific taxa until more collections are made. Additional fieldwork is required to clarify whether or not the species is truly disjunct since intermediate populations, if they occur, could conceivably span this morphological variation.

Paratypes. PERU. **Cajamarca:** Contumazá, Santiago Guzmango, 6 May 1965, A. Sagastegui & M. Fukushima 5070 (HUT); Contumazá, Bosque Cachil, fragment of montane rainforest, 7°24'S, 78°46'W, 17 May 1993, M. O. Dillon, A. Sagastegui, S. Leiva G., P. Lezama & P. Chuno 6506 (F); Contumazá, El Chorrillo (Cascas-Contumazá), 14 May 1994, A. Sagastegui, S. Leiva & P. Lezama 15245 (US); Contumazá, Cascas-Contumazá, 19 May 1962, A. Lopez, A. Sagastegui & I. Sanchez 3678 (HUT); Contumazá, Bosque Cachil, 16 June 1994, A. Sagastegui 15405 (F, MO, NY). **Piura:** Huancabamba, above Canchaque, 22 Mar. 1948, R. Ferreyra 3134 (GH, USM).

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